NOTICE OF REVISION (NOR) (See MIL-STD-480 for instructions) This revision described below has been authorized for the document listed.	**DATE (YYMMDD)** **92-11-16**	Form Approved OMB No. 0704-0188

1. ORIGINATOR NAME AND ADDRESS	**2. CAGE CODE**	**3. NOR NO.**
Defense Electronics Supply Center Dayton, Ohio 45444-5277	67268	5962-R022-93
	4. CAGE CODE 67268	**5. DOCUMENT NO.** **5962-38705**
6. TITLE OF DOCUMENT Microcircuits, Linear, Voltage Regulator, Adjustable, Monolithic Silicon	**7. REVISION LETTER** (Current) A	(New) B
	8. ECP NO. No registered users	

9. CONFIGURATION ITEM (OR SYSTEM) TO WHICH ECP APPLIES
All

10. DESCRIPTION OF REVISION

Sheet 1: Revisions ltr column; add "B".
Revisions description column; add "Changes in accordance with NOR 5962-R022-93".
Revisions date column; add "92-11-16".
Revision level block; add "B".
Rev status above sheet numbers 1, 14 and 15, add "B".

Sheet 14: 4.2.1a (1), burn-in test, delete "Test condition D" and substitute "Test condition C".
Revision level block; add "B".

Sheet 15: 4.4.3.1a, steady-state life test, , delete "Test condition D" and substitute "Test condition C".
Revision level block; add "B".

11. THIS SECTION FOR GOVERNMENT USE ONLY

a. CHECK ONE

[X] EXISTING DOCUMENT SUPPLEMENTED BY THIS NOR MAY BE USED IN MANUFACTURE.

[ ] REVISED DOCUMENT MUST BE RECEIVED BEFORE MANUFACTURER MAY INCORPORATE THIS CHANGE.

[ ] CUSTODIAN OF MASTER DOCUMENT SHALL MAKE ABOVE REVISION AND FURNISH REVISED DOCUMENT TO:

b. ACTIVITY AUTHORIZED TO APPROVE CHANGE FOR GOVERNMENT	SIGNATURE AND TITLE	DATE (YYMMDD)
DESC-ECS	Michael A. Frye Branch Chief	92-11-16
12. ACTIVITY ACCOMPLISHING REVISION DESC-ECS	REVISION COMPLETED (Signature) Marcia B Kelleher	DATE (YYMMDD) 92-11-16

REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Technical and editorial changes throughout.	91-12-27	M. A. Frye

REV																				
SHEET																				
REV			A	A	A	A	A	A	A	A	A	A								
SHEET	15	16	17	18	19	20	21	22	23	24	25	26	27	28						

REV STATUS OF SHEETS																	
REV													A		A		
SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14			

PMIC N/A

STANDARDIZED MILITARY DRAWING

THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

AMSC N/A

PREPARED BY
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DRAWING APPROVAL DATE
91-05-14

REVISION LEVEL
A

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUIT, LINEAR, VOLTAGE REGULATOR, ADJUSTABLE, MICROPOWER, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	**67268**	**5962-38705**

SHEET 1 OF 28

DESC FORM 193
SEP 87

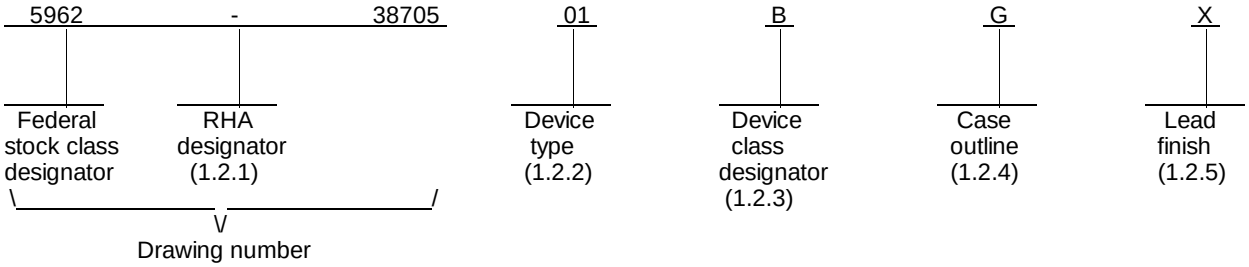
5962-E387

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

1. SCOPE

1.1 Scope. This drawing forms a part of a one part - one part number documentation system (see 6.6 herein). Two product assurance classes consisting of military high reliability (device classes B, Q, and M) and space application (device classes S and V), and a choice of case outlines and lead finishes are available and are reflected in the Part or Identifying Number (PIN). Device class M microcircuits represent non-JAN class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices". When available, a choice of radiation hardness assurance (RHA) levels are reflected in the PIN.

1.2 PIN. The PIN shall be as shown in the following example:



1.2.1 Radiation hardness assurance (RHA) designator. Device classes M, B, and S RHA marked devices shall meet the MIL-M-38510 specified RHA levels and shall be marked with the appropriate RHA designator. Device classes Q and V devices shall meet or exceed the electrical performance characteristics specified in table I herein after exposure to the specified irradiation levels specified in the absolute maximum ratings herein and the RHA marked device shall be marked in accordance with MIL-I-38535. A dash (-) indicates a non-RHA device.

1.2.2 Device type(s). The device type(s) shall identify the circuit function as follows:

Device type	Generic number	Circuit function
01	LP2951	Adjustable micropower voltage regulator

1.2.3 Device class designator. The device class designator shall be a single letter identifying the product assurance level as follows:

Device class	Device requirements documentation
M	Vendor self-certification to the requirements for non-JAN class B microcircuits in accordance with 1.2.1 of MIL-STD-883
B or S	Certification and qualification to MIL-M-38510
Q or V	Certification and qualification to MIL-I-38535

1.2.4 Case outline(s). For device classes M, B, and S, case outline(s) shall meet the requirements in appendix C of MIL-M-38510 and as listed below. For device classes Q and V, case outline(s) shall meet the requirements of MIL-I-38535, appendix C of MIL-M-38510, and as listed below.

Outline letter	Case outline
G	A-1 (8-lead, .370" x .185"), can package
P	D-4 (8-lead, .405" x .310" x .200"), dual-in-line package
2	C-2 (20-terminal, .358" x .358" x .100"), leadless square chip carrier package

1.2.5 Lead finish. The lead finish shall be as specified in MIL-M-38510 for classes M, B, and S or MIL-I-38535 for classes Q and V. Finish letter "X" shall not be marked on the microcircuit or its packaging. The "X" designation is for use in specifications when lead finishes A, B, and C are considered acceptable and interchangeable without preference.

1.3 Absolute maximum ratings. 1/

Input voltage range	-0.3 V dc to +30 V dc
Lead temperature (soldering, 10 seconds)	+260°C
Junction temperature (T_J) 2/	+160°C
Storage temperature range	-65°C to +150°C
Feedback input voltage range 3/ 4/	-1.5 V dc to +30 V dc
Shutdown input voltage range 3/	-0.3 V dc to +30 V dc
Error comparator output voltage 3/	-0.3 V dc to +30 V dc
Maximum power dissipation (P_D):	
Case G	675 mW at +25°C
Case P	1.0 W at +25°C
Case 2	1.25 W at +25°C
Thermal resistance, junction-to-ambient (Θ_{JA}): (stll air)	
Case G	180°C/W
Case P	120°C/W
Case 2	100°C/W
Thermal resistance, junction-to-case (Θ_{JC})	See MIL-M-38510, appendix C

1.4 Recommended operating conditions. 5/ 6/

Input voltage	+6 V dc
Ambient operating temperature range ($_TA$)	-55°C to +125°C

2. APPLICABLE DOCUMENTS

2.1 Government specifications, standards, bulletin, and handbook. Unless otherwise specified, the following specifications, standards, bulletin, and handbook of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

SPECIFICATIONS

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.
MIL-I-38535 - Integrated Circuits, Manufacturing, General Specification for.

1/ Stresses above the absolute maximum rating may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.
2/ The device is protected by a thermal shutdown circuit which is designed to turn off the output transistor whenever the junction temperature exceeds +160°C.
3/ May exceed input supply voltage.
4/ When used in dual supply systems where the output voltage sees loads returned to a negative supply, the output voltage should be diode-clamped to ground.
5/ A 1.0 µF capacitor is required between output and ground for stability. A 0.1 µF capacitor is recommended between the input and ground when there is more than 10 inches of wire on the input, or when the input is driven from a battery.
6/ When using external resistors to set the output voltage of the regulator, a minimum load current of 1 µA is recommended.

STANDARDS

MILITARY

MIL-STD-480 - Configuration Control-Engineering Changes, Deviations and Waivers.
MIL-STD-883 - Test Methods and Procedures for Microelectronics.

BULLETIN

MILITARY

MIL-BUL-103 - List of Standardized Military Drawings (SMD's).

HANDBOOK

MILITARY

MIL-HDBK-780 - Standardized Military Drawings.

(Copies of the specifications, standards, bulletin, and handbook required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements for device class M shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein. This is a fully characterized military detail specification and is suitable for qualification of device classes B and S to the requirements of MIL-M-38510. The individual item requirements for device classes Q and V shall be in accordance with MIL-M-38535 and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 for device classes M, B, and S and MIL-I-38535 for device classes Q and V and herein.

3.2.1 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.2 Case outline(s). The case outline(s) shall be in accordance with 1.2.4 herein.

3.3 Electrical performance characteristics and postirradiation parameter limits. Unless otherwise specified herein, the electrical performance characteristics and postirradiation parameter limits are as specified in table I and shall apply over the full ambient operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table IIA. The electrical tests for each subgroup are defined in tables I and III.

3.5 Marking. The part shall be marked with the PIN listed in 1.2 herein. Marking for device class M shall be in accordance with MIL-STD-883 (see 3.1 herein). In addition, the manufacturer's PIN may also be marked as listed in MIL-BUL-103. Marking for device classes B and S shall be in accordance with MIL-M-38510. Marking for device classes Q and V shall be in accordance with MIL-I-38535.

3.5.1 Certification/compliance mark. The compliance mark for device class M shall be a "C" as required in MIL-STD-883 (see 3.1 herein). The certification mark for device classes B and S shall be a "J" or "JAN" as required in MIL-M-38510. The certification mark for device classes Q and V shall be a "QML" as required in MIL-I-38535.

3.6 Certificate of compliance. For device class M, a certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in MIL-BUL-103 (see 6.7.3 herein). For device classes Q and V, a certificate of compliance shall be required from a QML-38535 listed manufacturer in order to supply to the requirements of this drawing (see 6.7.2 herein). The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply for this drawing shall affirm that the manufacturer's product meets, for device class M the requirements of MIL-STD-883 (see 3.1 herein), or for device classes Q and V, the requirements of MIL-I-38535 and the requirements herein.

3.7 Certificate of conformance. A certificate of conformance as required for device class M in MIL-STD-883 (see 3.1 herein) or device classes B and S in MIL-M-38510 or for device classes Q and V in MIL-I-38535 shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change for device class M. For device class M, notification to DESC-ECS of change of product (see 6.2 herein) involving devices acquired to this drawing is required for any change as defined in MIL-STD-480.

3.9 Verification and review for device class M. For device class M, DESC, DESC's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

3.10 Microcircuit group assignment for device classes M, B, and S. Device classes M, B, and S devices covered by this drawing shall be in microcircuit group number 52 (see MIL-M-38510, appendix E).

3.11 Serialization for device class S. All device class S devices shall be serialized in accordance with MIL-M-38510.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. For device class M, sampling and inspection procedures shall be in accordance with section 4 of MIL-M-38510 to the extent specified in MIL-STD-883 (see 3.1 herein). For device classes B and S, sampling and inspection procedures shall be in accordance with MIL-M-38510 and method 5005 of MIL-STD-883, except as modified herein. For device classes Q and V, sampling and inspection procedures shall be in accordance with MIL-I-38535 and the device manufacturer's QM plan.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device class	Limits		Unit
					Min	Max	
Output voltage	V_O		1	B,M,S	4.975	5.025	V
			2, 3		4.940	5.060	
Line regulation	V_{OLINE}	$6 V \le V_{IN} \le 30 V$, $I_L = 1 mA$	1	B,M,S	-5.0	+5.0	mV
			2, 3		-25.0	+25.0	
Load regulation	V_{OLOAD}	$-100 \mu A \le I_L \le -100 mA$	1	B,M,S	-5.0	+5.0	mV
			2, 3		-15.0	+15.0	
Dropout voltage	V_{DO}	$I_L = -100 mA$	1	B,M,S		450	mV
			2, 3			600	
			1			80	
			2, 3			150	
Ripple rejection	RR	f = 120 Hz, $T_A = +25°C$, $V_{IN} = 0.1$ Vrms, See figure 3	4	B,S	50		dB
Ground current	I_G	$I_L = -100 mA$	1	B,M,S		12	mA
			2, 3			14	
			1			120	µA
			2, 3			140	
		$V_{IN} = 30 V$, $V_O = 15 V$	1			120	
			2, 3			140	
		$V_{IN} = 30 V$, $V_O = 15 V$, $I_L = -100 mA$	1			15	mA
			2, 3			20	
Ground current change	I_{GDIFF}	$6 V \le V_{IN} \le 30 V$	1	B,M,S	-30	+30	µA
			2, 3		-50	+50	

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device class	Limits		Unit
					Min	Max	
Ground current at current limit	I_{GSC}		1	B,S		20	mA
			2, 3			25	
Dropout ground current	I_{GDO}	V_{IN} = 4.5 V	1	B,M,S		170	µA
			2, 3			200	
Current limit	I_{SC}	2/	1	B,M,S		200	mA
			2, 3			220	
Thermal regulation	V_{RTH}	V_{IN} = 30 V, I_L = 50 mA, T_A = +25°C	1	B,M,S	-12.5	+12.5	mV
Reference voltage	V_{REF}		1	B,M,S	1.22	1.25	V
			2, 3		1.20	1.26	
Reference voltage line regulation	V_{RLINE}	2.3 V $\le V_{IN} \le$ 30 V	1	B,M,S	-1.9	+1.9	mV
			2, 3		-10.0	+10.0	
Reference voltage output regulation	V_{RLOAD}	1.2 V $\le V_O \le$ 29 V, V_{IN} = 30 V	1	B,M,S	-1.2	+1.2	mA
			2, 3		-5.0	+5.0	
Feedback pin bias current	I_{FB}		1	B,M,S		40	nA
			2, 3			60	
Error comparator output leakage current	I_{OH}	3/	1	B,M,S		1	µA
			2, 3			2	
Error comparator output low voltage 5/	V_{OL}	V_{IN} = 4.5 V, I_{OL} = 400 µA 4/ 11/	1	B,M,S		250	mV
			2, 3			400	
Error comparator upper threshold voltage 5/	V_{UT}	6/	1	B,M,S	40		mV
			2, 3		25		

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device class	Limits		Unit
					Min	Max	
Error comparator lower threshold voltage 5/	V_{LT}	7/	1	B,M,S		95	mV
			2, 3			140	
Shutdown input logic voltage	V_{SDL}	8/	1, 2, 3	B,M,S		0.6	V
	V_{SDH}	9/			2.0		
Shutdown pin input current	I_{SD}	V_{SD} = 2.4 V, $\overline{ERROR}$ = 30 V	1	B,M,S		50	µA
			2, 3			100	
		V_{SD} = 30 V, $\overline{ERROR}$ = 30 V	1			600	
			2, 3			750	
Regulator output current in shutdown	I_{LKG}	V_{IN} = 30 V, V_{SD} = 2 V 2/	1	B,S	-10	10	µA
			2, 3		-20	20	
Output leakage current in shutdown	I_{LSD}	V_{SD} = 1.5 V, V_{IN} = 30 V	1	M	-10	10	µA
			2, 3		-20	20	
Output noise 10 Hz to 100 kHz	V_{NOISE1}	C1 = 1 µF	7	B,S		600	µV rms
		C1 = 3.3 µ 10/				250	

See footnotes at end of table.

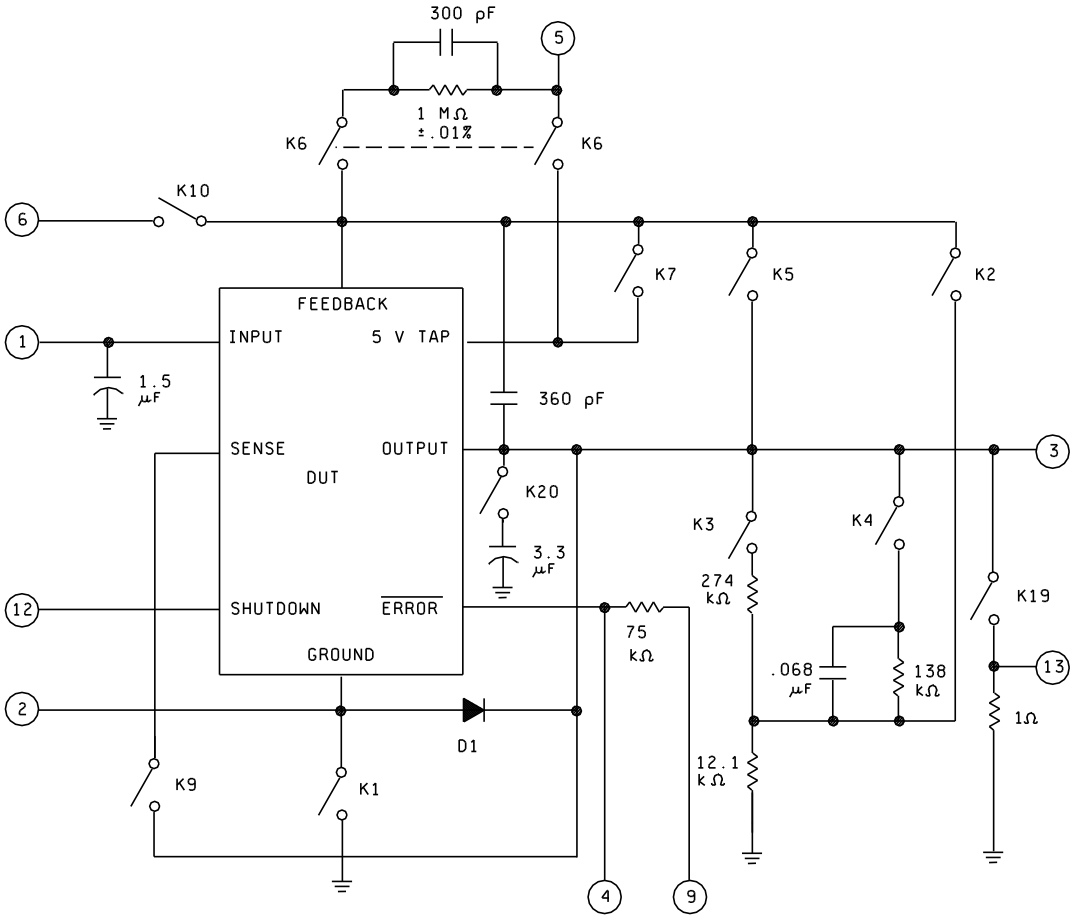
TABLE I. Electrical performance characteristics - Continued.

1/ Unless otherwise specified, V_{IN} = 6 V, I_L = -100 µA, C_{LOAD} = 3.3 µF (see figure 2), feedback pin tied to 5 V tap pin, output pin tied to sense pin, and $V_{SD} \leq 0.6$ V , and V_{OUT} = 5 V nominal.
2/ Measured by shorting the output to ground through a 1.0Ω resistor (see figure 2).
3/ Voltage at test fixture pin 9 is 30 V. I_{OH} measured by the pin 9 source.
4/ Voltage at test fixture pin 9 is 30 V. Measure V_{OL} at the test fixture pin 4.
5/ Comparator thresholds are expressed in terms of a voltage differential at the feedback pin below the nominal reference voltage measured with V_{IN} = 6 V. To express these thresholds in terms of output voltage change, multiply by the error amplifier gain, V_{OUT}/V_{REF} = (R1 + R2)/R2. For example, at V_{OUT} = 5 V, the error pin is guaranteed to go low when V_{OUT} drops by 95 mV x 5 V/1.235 V, or 384 mV. Thresholds remain constant as a percent of V_{OUT}, with the dropout warning occuring at a maximum of 7.5 percent below the nominal V_{OUT}. If the voltage at device pin 7(V_{LT}) drops more than 95 mV below V_{REF} (table I, +25°C), the voltage at device pin 5 must be below 0.8 V (table III, +25°C). If the voltage at device pin 7(V_{UT}) then rises to less than 40 mV below V_{REF} (table I, +25°C), the voltage at device pin 5 must be above 2.0 V (table III, +25°C).
6/ Voltage at test fixture pin 9 is 30 V. Measure V_{UT} at the test fixture pin 4.
7/ Voltage at test fixture pin 9 is 30 V. Measure V_{LT} at the test fixture pin 4.
8/ V_{SDL} is guaranteed by applying 0.6 V to test circuit pin 12 (figure 2) on test number 1 (subgroup 1), test number 29 (subgroup 2), and test number 55 (subgroup 3). V_O remains with specification.
9/ V_{SDH} is guaranteed by applying 2.0 V to test circuit pin 12 (figure 3) on test number 23 (subgroup 1), test number 49 (subgroup 2), and test number 75 (subgroup 3). V_{OL} remains within specification. Must apply 30 V to test fixture pin 9.
10/ With C bypass (feedback to output) = 0.01 µF.
11/ 30 V at pin 9 across 75 kΩ resistor causes the condition of I_{OL} = 400 µA.

Device type	01	
Case outlines	G and P	2
Terminal numbers	Terminal connections	
1	OUTPUT	NC
2	SENSE	OUTPUT
3	SHUTDOWN	NC
4	GROUND	NC
5	$\overline{\text{ERROR}}$	SENSE
6	5 V TAP	NC
7	FEEDBACK	SHUTDOWN
8	INPUT	NC
9	----	NC
10	----	GROUND
11	----	NC
12	----	$\overline{\text{ERROR}}$
13	----	NC
14	----	NC
15	----	5 V TAP
16	----	NC
17	----	FEEDBACK
18	----	NC
19	----	NC
20	----	INPUT

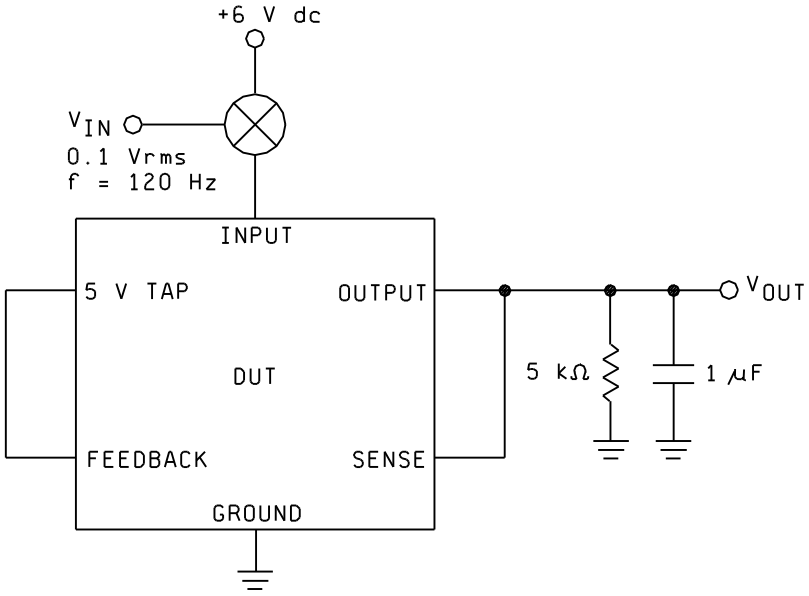
NC = No connection

FIGURE 1. Terminal connections.



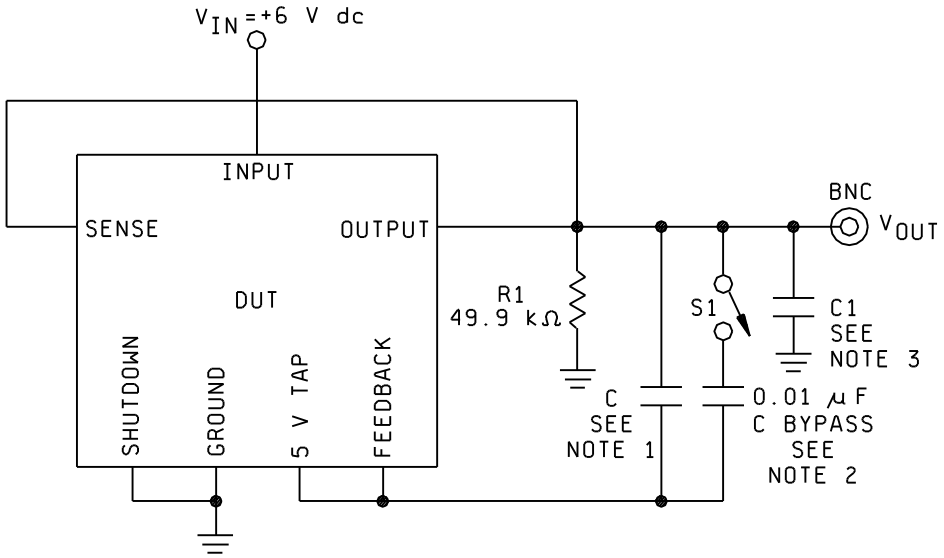
NOTES:
1. Unless otherwise specified, tolerance for all resistors is ±5 percent.
2. Diode D1 is type 1N4002 or equivalent.

FIGURE 2. Test circuit for static and dynamic tests.



NOTES:
1. The input signal appearing at pin 8 of the device under test (DUT) is a 120 Hz, 0.1 V rms sine wave with a +6 V dc offset.
2. The instrument(s) used to measure V_{IN} and V_{OUT} shall have a minimum bandwidth of 10 Hz to 10 kHz, and shall measure true rms voltages. A 20 Hz to 200 Hz filter may be added to filter output noise to allow measurement of true ripple rejection.
3. If the output signal is too weak for the measurement instrument to detect, an amplifier with a gain of 1000 may be added to the DUT output.
4. Calculate: a. Without additional gain at output: RR = 20 log (V_{IN}/V_{OUT}).
   b. With additional gain of 1000 at DUT output: RR = 20 log (1000 V_{IN}/V_{OUT}).

FIGURE 3. Test circuit for ripple rejection (RR) test.



NOTES:
1. Not necessary for bench box. May be necessary if circuit is integrated figure 2 test circuit. Value of C dependent of correlation to bench box. Add capacitance as necessary to compensate for automatic test equipment (ATE) stray capacitance.
2. With C bypass (pin 1 to pin 7) = 0.01 µF.
3. Test 1: C1 = 1 µF, S1 is open. V_{NOISE1} = rms value of V_{OUT}.
   Test 2: C1 = 3.3 µF, S1 is open. V_{NOISE2} = rms value of V_{OUT}.

FIGURE 4. Test circuit for noise tests.

4.2 Screening. For device class M, screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. For device classes B and S, screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to qualification and quality conformance inspection. For device classes Q and V, screening shall be in accordance with MIL-I-38535, and shall be conducted on all devices prior to qualification and technology conformance inspection.

4.2.1 Additional criteria for device classes M, B, and S.

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition D. For device class M, the test circuit shall be submitted to DESC-ECS for review with the certificate of compliance. For device classes B and S, the test circuit shall be submitted to the qualifying activity.

(2) T_A = +125°C, minimum.

b. Interim and final electrical test parameters shall be as specified in table IIA herein.

c. The percent defective allowable (PDA) for class S and class B devices shall be as specified in MIL-M-38510, based on failures from group A, subgroup 1 test after cooldown as final electrical test in accordance with method 5004 of MIL-STD-883 and no intervening electrical measurements. If interim electrical parameter tests are performed prior to burn-in, failures resulting from pre burn-in screening may be excluded from the PDA. If interim electrical parameter tests prior to burn-in are omitted, then all screening failures shall be included in the PDA. The verified failures of group A, subgroup 1 after burn-in divided by the total number of devices submitted for burn-in in that lot shall be used to determine the percent defective for that lot, and the lot shall be accepted or rejected based on the PDA for the applicable device class.

4.2.2 Additional criteria for device classes Q and V.

a. The burn-in test duration, test condition and test temperature or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-I-38535. The burn-in test circuit shall be submitted to DESC-ECS with the certificate of compliance and shall be under the control of the device manufacturer's Technology Review Board (TRB) in accordance with MIL-I-38535.

b. Interim and final electrical test parameters shall be as specified in table IIA herein.

c. Additional screening for device class V beyond the requirements of device class Q shall be as specified in appendix B of MIL-I-38535 and as detailed in table IIB herein.

4.3 Qualification inspection.

4.3.1 Qualification inspection for device classes B and S. Qualification inspection for device classes B and S shall be in accordance with MIL-M-38510. Inspections to be performed shall be those specified in method 5005 of MIL-STD-883 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.5).

4.3.2 Qualification inspection for device classes Q and V. Qualification inspection for device classes Q and V shall be in accordance with MIL-I-38535. Inspections to be performed shall be those specified in MIL-I-38535 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.5).

4.4 Conformance inspection. Quality conformance inspection for device class M shall be in accordance with MIL-STD-883 (see 3.1 herein) and as specified herein. Quality conformance inspection for device classes B and S shall be in accordance with MIL-M-38510 and as specified herein. Inspections to be performed for device classes M, B, and S shall be those specified in method 5005 of MIL-STD-883 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.5). Technology conformance inspection for classes Q and V shall be in accordance with MIL-I-38535 including groups A, B, C, D, and E inspections and as specified herein except where option 2 of MIL-I-38535 permits alternate in-line control testing.

4.4.1 Group A inspection.

a. Tests shall be as specified in table IIA and table III herein.

b. For device class M, subgroups 7 and 8 tests shall be sufficient to verify the truth table. For device classes B and S, subgroups 7 and 8 tests shall be sufficient to verify the truth table as approved by the qualifying activity. For device classes Q and V, subgroups 7 and 8 shall include verifying the functionality of the device.

4.4.2 Group B inspection. The group B inspection end-point electrical parameters shall be as specified in table IIA and figure 2 herein.

4.4.3 Group C inspection. The group C inspection end-point electrical parameters shall be as specified in table IIA herein.

4.4.3.1 Additional criteria for device classes M, B, and S. Steady-state life test conditions, method 1005 of MIL-STD-883:

a. Test condition D. For device class M, the test circuit shall be submitted to DESC-ECS for review with the certificate of compliance. For device classes B and S, the test circuit shall be submitted to the qualifying activity.

b. T_A = +125°C, minimum.

c. Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

4.4.3.2 Additional criteria for device classes Q and V. The steady-state life test duration, test condition and test temperature or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-I-38535. The steady-state life test circuit shall be submitted to DESC-ECS with the certificate of compliance and shall be under the control of the device manufacturer's TRB in accordance with MIL-I-38535.

TABLE IIA. Electrical test requirements.

Test requirements	Subgroups (per method 5005, table I)			Subgroups (per MIL-I-38535, table III)	
	Device class M	Device class B	Device class S	Device class Q	Device class V
Interim electrical parameters (see 4.2)	1	1	1	1	1
Final electrical parameters (see 4.2)	1,2,3 1/	1,2,3 1/	1,2,3 1/	1,2,3 1/	1,2,3 1/
Group A test requirements (see 4.4)	1,2,3	1,2,3, 4,7	1,2,3, 4,7	1,2,3, 4,7	1,2,3, 4,7
Group B end-point electrical parameters (see 4.4)	------	------	1,2, 3, 4,7 2/	------	1,2,3, 4,7
Group C end-point electrical parameters (see 4.4)	1,2,3	1,2,3 2/	------	1,2,3	------
Group D end-point electrical parameters (see 4.4)	1	1	1	1	1
Group E end-point electrical parameters (see 4.4)	1	1,4,7	1,4,7	1,4,7	1,4,7

1/ PDA applies to subgroup 1.
2/ Delta limits in accordance with table IIC shall be computed with reference to the previous interim electrical parameters.

TABLE IIB. Additional screening for device class V.

Test	MIL-STD-883, test method	Lot requirement
Particle impact noise detection	2020	100%
Internal visual	2010, condition A or approved alternate	100%
Nondestructive bond pull	2023 or approved alternate	100%
Reverse bias burn-in	1015	100%
Burn-in	1015, total of 240 hours at +125°C	100%
Radiographic	2012	100%

TABLE IIC. Group C end-point electrical parameters, T_A = +25°C.

Device type	Test	Limit		Unit	Delta 1/		Unit
		Min	Max		Min	Max	
01	V_{REF}	1.22	1.25	V	-5.5	+5.5	mV
	I_{G2}	0	120	µA	-6.5	+6.5	µA

1/ Delta limits apply to the measured value (see MIL-M-38510).

TABLE III. Group A inspection for device type 01.

Subgroup number	Symbol 1/	Test number	Adapter pin number						Relays energized
			1	2	3	6	9	12	
1	V_O	1	6 V	0 V	-100 µA	open	open	0.6 V	1,7,9
T_A = +25°C	V_{OLINE}	2	30 V	0 V	-1 mA	open	open	0.6 V	1,7,9
	V_{OLINE}	3	6 V	0 V	-1 mA	open	open	0.6 V	1,7,9
	V_{OLOAD}	4	6 V	0 V	-100 mA	open	open	0.6 V	1,7,9
	V_{OLOAD}	5	6 V	0 V	-100 µA	open	open	0.6 V	1,7,9
	VDO1	6	Z 2/	0 V	-100 mA	open	open	0.6 V	1,7,9
	V_{DO2}	7	Z 2/	0 V	-100 µA	open	open	0.6 V	1,7,9
	I_{G1}	8	6 V	0 V	-100 mA	open	open	0.6 V	1,7,9
	I_{G2}	9	6 V	0 V	-100 µA	open	open	0.6 V	1,7,9
	I_{GDIFF}	10	30 V	0 V	-100 µA	open	open	0.6 V	1,7,9
	I_{GDO}	11	4.5 V	0 V	-100 µA	open	open	0.6 V	1,7,9
	I_{G3}	12	30 V	0 V	open	open	open	0.6 V	1,2,4
	I_{G4}	13	30 V	0 V	-100 mA	open	open	0.6 V	1,2,4
	I_{SC}	14	6 V	0 V	3/	open	open	0.6 V	1,7,9,19
	I_{GSC}	15	6 V	1 mV	3/	open	open	0.6 V	7,9,19
	V_{RTH} 4/	16	30 V	0 V	-50 mA	open	open	0.6 V	1,7,9
	V_{RTH} 4/	17	30 V	0 V	-50 mA	open	open	0.6 V	1,7,9
	V_{REF}	18	6 V	0 V	-100 µA	open	open	0.6 V	1,7,9,10
	V_{RLINE}	19	2.3 V	0 V	-100 µA	open	open	0.6 V	1,2,5,9,10
	V_{RLINE}	20	30 V	0 V	-100 µA	open	open	0.6 V	1,2,5,9,10
	V_{RLOAD}	21	30 V	0 V	-100 µA	open	open	0.6 V	1,2,3,9,10
	V_{RLOAD}	22	30 V	0 V	-100 µA	open	open	0.6 V	1,3,5,9,10
	I_{FB}	23	6 V	0 V	-100 µA	open	open	0.6 V	1,6,9,10
	I_{OH}	24	6 V	0 V	-100 µA	open	30 V	0.6 V	1,7,9

See footnotes at end of table.

TABLE III. Group A inspection for device type 01 - Continued.

Subgroup number	Symbol 1/	Test number	Pin measured			Equation 5/	Limits		Unit
			Number	Value	Unit		Min	Max	
1	V_O	1	3	E1	V	V_{OUT} = E1	+4.975	+5.025	V
T_A= +25° C	V_{OLINE}	2	3	E2	V				
	V_{OLINE}	3	3	E2A	V	VOLINE = (E2 - E2A) x 1000	-5.0	+5.0	mV
	V_{OLOAD}	4	3	E3	V				
	V_{OLOAD}	5	3	E3A	V	V_{OLOAD} = (E3 - E3A) x 1000	-5.0	+5.0	mV
	V_{DO1}	6	3	E4	V	V_{DO1} = (Z_{FINAL} - E4) x 1000		450	mV
	V_{DO2}	7	3	E5	V	V_{DO2} = (Z_{FINAL} - E5) x 1000		80	mV
	I_{G1}	8	1	I1	mA	I_{G1} = I1 - 100		12	mA
	I_{G2}	9	1	I2	µA	I_{G2} = I2 -100		120	µA
	I_{GDIFF}	10	1	I3	µA	I_{GDIFF} = I3 - I2	-30	+30	µA
	I_{GDO}	11	1	I4	µA	I_{GDO} = I4 - 100		170	µA
	I_{G3}	12	1	I5	µA	I_{G3} = I5 - 100		120	µA
	I_{G4}	13	1	I6	mA	I_{G4} = I6 - 100		15	mA
	I_{SC}	14	13	E6	V	I_{SC} = E6 x 1000		200	mA
	I_{GSC}	15	2	I7	mA	I_{GSC} = I7		20	mA
	V_{RTH} 4/	16	3	E7	V				
	V_{RTH} 4/	17	3	E8	V	V_{RTH} = (E8-E7) x 1000	-12.5	+12.5	mV
	V_{REF}	18	6	E9	V	V_{REF} = E9	1.22	1.25	V
	V_{RLINE}	19	6	E10	V				
	V_{RLINE}	20	6	E11	V	V_{RLINE} = (E11 - E10) x 1000	-1.9	+1.9	mV
	V_{RLOAD}	21	6	E12	V				
	V_{RLOAD}	22	6	E13	V	V_{RLOAD} = (E13 - E12) x 1000	-1.2	+1.2	mV
	I_{FB}	23	5,6	E14	V	I_{FB} = E14 x 1000		40	nA
	I_{OH}	24	9	I8	µA	I_{OH} = I8		1	µA

See footnotes at end of table.

TABLE III. Group A inspection for device type 01 - Continued.

Subgroup number	Symbol 1/	Test number	Adapter pin number						Relays energized
			1	2	3	6	9	12	
1 T_A = +25°C	V_{OL}	25	4.5 V	0 V	-100 µA	open	30 V	2 V	1,7,9
	V_{UT}	26 6/	6 V	0 V	-100 µA	6/	30 V	0.6 V	1,7,9,10
	V_{LT}	27 6/	6 V	0 V	-100 µA	6/	30 V	0.6 V	1,7,9,10
	I_{SD1}	28	6 V	0 V	-100 µA	open	30 V	2.4 V	1,7,9
	I_{SD2}	29	6 V	0 V	-100 µA	open	30 V	30 V	1,7,9
	I_{LKG}	30	30 V	0 V	0 V	open	30 V	2 V	1,7,9,20
2 T_A = +125°C	V_O	31	6 V	0 V	-100 µA	open	open	0.6 V	1,7,9
	V_{OLINE}	32	30 V	0 V	-1 mA	open	open	0.6 V	1,7,9
	V_{OLINE}	33	6 V	0 V	-1 mA	open	open	0.6 V	1,7,9
	V_{OLOAD}	34	6 V	0 V	-100 mA	open	open	0.6 V	1,7,9
	V_{OLOAD}	35	6 V	0 V	-100 µA	open	open	0.6 V	1,7,9
	V_{DO1}	36	Z 2/	0 V	-100 mA	open	open	0.6 V	1,7,9
	V_{DO2}	37	Z 2/	0 V	-100 µA	open	open	0.6 V	1,7,9
	I_{G1}	38	6 V	0 V	-100 mA	open	open	0.6 V	1,7,9
	I_{G2}	39	6 V	0 V	-100 µA	open	open	0.6 V	1,7,9
	I_{GDIFF}	40	30 V	0 V	-100 µA	open	open	0.6 V	1,7,9
	I_{GDO}	41	4.5 V	0 V	-100 µA	open	open	0.6 V	1,7,9
	I_{G3}	42	30 V	0 V	open	open	open	0.6 V	1,2,4
	I_{G4}	43	30 V	0 V	-100 mA	open	open	0.6 V	1,2,4
	I_{SC}	44	6 V	0 V	3/	open	open	0.6 V	1,7,9,19
	I_{GSC}	45	6 V	1 mV	3/	open	open	0.6 V	7,9,19
	V_{REF}	46	6 V	0 V	-100 µA	open	open	0.6 V	1,7,9,10
	V_{RLINE}	47	2.3 V	0 V	-100 µA	open	open	0.6 V	1,2,5,9,10
	V_{RLINE}	48	30 V	0 V	-100 µA	open	open	0.6 V	1,2,5,9,10

See footnotes at end of table.

TABLE III. Group A inspection for device type 01 - Continued.

Subgroup number	Symbol 1/	Test number	Pin measured			Equation 5/	Limits		Unit
			Number	Value	Unit		Min	Max	
1 T_A = +25°C	V_{OL}	25	4	E15	V	V_{OL} = E15 x 1000		250	mV
	V_{UT}	26 6/	4	E16	V	E16 6/	2.0	30	V
	V_{LT}	27 6/	4	E17	V	E17 6/	0	0.8	V
	I_{SD1}	28	12	I9	µA	I_{SD1} = I9		50	µA
	I_{SD2}	29	12	I10	µA	I_{SD2} = I10		600	µA
	I_{LKG}	30	3	I11	µA	I_{LKG} = I11	-10	+10	µA
2 T_A = +125°C	V_O	31	3	E18	V	V_{OUT} = E18	+4.940	+5.060	V
	V_{OLINE}	32	3	E19	V				
	V_{OLINE}	33	3	E19A	V	V_{OLINE} = (E19 - E19A) x 1000	-25.0	+25.0	mV
	V_{OLOAD}	34	3	E20	V				
	V_{OLOAD}	35	3	E20A	V		-15.0	+15.0	mV
	V_{DO1}	36	3	E21	V	V_{OLOAD} = (E20 - E20A) x 1000		600	mV
	V_{DO2}	37	3	E22	V	V_{DO1} = (Z_{FINAL} - E21) x 1000 V_{DO2} = (Z_{FINAL} - E22) x 1000		150	mV
	I_{G1}	38	1	I12	mA	I_{G1} = I12 - 100		14	mA
	I_{G2}	39	1	I13	µA	I_{G2} = I13 - 100		140	µA
	I_{GDIFF}	40	1	I14	µA	I_{GDIFF} = I14 - I13	-50	+50	µA
	I_{GDO}	41	1	I15	µA	I_{GDO} = I15 - 100		200	µA
	I_{G3}	42	1	I16	µA	I_{G3} = I16 - 100		140	µA
	I_{G4}	43	1	I17	mA	I_{G4} = I17 - 100		20	mA
	I_{SC}	44	13	E23	V	I_{SC} = E23 x 1000		220	mA
	I_{GSC}	45	2	I18	mA	I_{GSC} = I18		25	mA
	V_{REF}	46	6	E24	V	V_{REF} = E24	1.20	1.26	V
	V_{RLINE}	47	6	E25	V				
	V_{RLINE}	48	6	E26	V	V_{RLINE} = (E26 - E25) x 1000	-10	+10	mV

See footnotes at end of table.

TABLE III. Group A inspection for device type 01 - Continued.

Subgroup number	Symbol 1/	Test number	Adapter pin number						Relays energized
			1	2	3	6	9	12	
2 T_A = +125°C	V_{RLOAD}	49	30 V	0 V	-100 µA	open	open	0.6 V	1,2,3,9,10
	V_{RLOAD}	50	30 V	0 V	-100 µA	open	open	0.6 V	1,3,5,9,10
	I_{FB}	51	6 V	0 V	-100 µA	open	open	0.6 V	1,6,9,10
	I_{OH}	52	6 V	0 V	-100 µA	open	30 V	0.6 V	1,7,9
	V_{OL}	53	4.5 V	0 V	-100 µA	open	30 V	2 V	1,7,9
	V_{UT}	54 6/	6 V	0 V	-100 µA	6/	30 V	0.6 V	1,7,9,10
	V_{LT}	55 6/	6 V	0 V	-100 µA	6/	30 V	0.6 V	1,7,9,10
	I_{SD1}	56	6 V	0 V	-100 µA	open	30 V	2.4 V	1,7,9
	I_{SD2}	57	6 V	0 V	-100 µA	open	30 V	30 V	1,7,9
	I_{LKG}	58	30 V	0 V	0 V	open	30 V	2 V	1,7,9,20
3 T_A = -55°C	V_O	59	6 V	0 V	-100 µA	open	open	0.6 V	1,7,9
	V_{OLINE}	60	30 V	0 V	-1 mA	open	open	0.6 V	1,7,9
	V_{OLINE}	61	6 V	0 V	-1 mA	open	open	0.6 V	1,7,9
	V_{OLOAD}	62	6 V	0 V	-100 mA	open	open	0.6 V	1,7,9
	V_{OLOAD}	63	6 V	0 V	-100 µA	open	open	0.6 V	1,7,9
	V_{DO1}	64	Z 2/	0 V	-100 mA	open	open	0.6 V	1,7,9
	V_{DO2}	65	Z 2/	0 V	-100 µA	open	open	0.6 V	1,7,9
	I_{G1}	66	6 V	0 V	-100 mA	open	open	0.6 V	1,7,9
	I_{G2}	67	6 V	0 V	-100 µA	open	open	0.6 V	1,7,9
	I_{GDIFF}	68	30 V	0 V	-100 µA	open	open	0.6 V	1,7,9
	I_{GDO}	69	4.5 V	0 V	-100 µA	open	open	0.6 V	1,7,9
	I_{G3}	70	30 V	0 V	open	open	open	0.6 V	1,2,4
	I_{G4}	71	30 V	0 V	-100 mA	open	open	0.6 V	1,2,4
	I_{SC}	72	6 V	0 V	3/	open	open	0.6 V	1,7,9,19
	I_{GSC}	73	6 V	1 mV	3/	open	open	0.6 V	7,9,19

See footnotes at end of table.

TABLE III. Group A inspection for device type 01 - Continued.

Subgroup number	Symbol 1/	Test number	Pin measured			Equation 5/	Limits		Unit
			Number	Value	Unit		Min	Max	
2 T_A = +125°C	V_{RLOAD}	49	6	E27	V				
	V_{RLOAD}	50	6	E28	V	V_{RLOAD} = (E28 -E27) x 1000	-5	+5	mV
	I_{FB}	51	5,6	E29	V	I_{FB} = E29 x 1000		60	nA
	I_{OH}	52	9	I19	µA	I_{OH} = I19		2	µA
	V_{OL}	53	4	E30	V	V_{OL} = E30 x 1000		400	mV
	V_{UT}	54 6/	4	E31	V	E31 6/	2.0	30	V
	V_{LT}	55 6/	4	E32	V	E32 6/	0	0.8	V
	I_{SD1}	56	12	I20	µA	I_{SD1} = I20		100	µA
	I_{SD2}	57	12	I21	µA	I_{SD2} = I21		750	µA
	I_{LKG}	58	3	I22	µA	I_{LKG} = I22	-20	+20	µA
3 T_A = -55°C	V_O	59	3	E18	V	V_{OUT} = E33	+4.940	+5.060	V
	V_{OLINE}	60	3	E19	V				
	V_{OLINE}	61	3	E19A	V	VOLINE = (E34 - E34A) x 1000	-25.0	+25.0	mV
	V_{OLOAD}	62	3	E20	V				
	V_{OLOAD}	63	3	E20A	V	V_{OLOAD} = (E35 - E35A) x 1000	-15.0	+15.0	mV
	V_{DO1}	64	3	E21	V	V_{DO1} = (Z_{FINAL} - E36) x 1000		600	mV
	V_{DO2}	65	3	E22	V	V_{DO2} = (Z_{FINAL} - E37) x 1000		150	mV
	I_{G1}	66	1	I12	mA	I_{G1} = I23 - 100		14	mA
	I_{G2}	67	1	I13	µA	I_{G2} = I24 - 100		140	µA
	I_{GDIFF}	68	1	I14	µA	I_{GDIFF} = I25 - I24	-50	+50	µA
	I_{GDO}	69	1	I15	µA	I_{GDO} = I26 - 100		200	µA
	I_{G3}	70	1	I16	µA	I_{G3} = I27 - 100		140	µA
	I_{G4}	71	1	I17	mA	I_{G4} = I28 - 100		20	mA
	I_{SC}	72	13	E23	V	I_{SC} = E38 x 1000		220	mA
	I_{GSC}	73	2	I18	mA	I_{GSC} = I29		25	mA

See footnotes at end of table.

TABLE III. Group A inspection for device type 01 - Continued.

Subgroup number	Symbol 1/	Test number	Adapter pin number						Relays energized
			1	2	3	6	9	12	
3 T_A = -55°C	V_{REF}	74	6 V	0 V	-100 µA	open	open	0.6 V	1,7,9,10
	V_{RLINE}	75	2.3 V	0 V	-100 µA	open	open	0.6 V	1,2,5,9,10
	V_{RLINE}	76	30 V	0 V	-100 µA	open	open	0.6 V	1,2,5,9,10
	V_{RLOAD}	77	30 V	0 V	-100 µA	open	open	0.6 V	1,2,3,9,10
	V_{RLOAD}	78	30 V	0 V	-100 µA	open	open	0.6 V	1,3,5,9,10
	I_{FB}	79	6 V	0 V	-100 µA	open	open	0.6 V	1,6,9,10
	I_{OH}	80	6 V	0 V	-100 µA	open	30 V	0.6 V	1,7,9
	V_{OL}	81	4.5 V	0 V	-100 µA	open	30 V	2 V	1,7,9
	V_{UT}	82 6/	6 V	0 V	-100 µA	6/	30 V	0.6 V	1,7,9,10
	V_{LT}	83 6/	6 V	0 V	-100 µA	6/	30 V	0.6 V	1,7,9,10
	I_{SD1}	84	6 V	0 V	-100 µA	open	30 V	2.4 V	1,7,9
	I_{SD2}	85	6 V	0 V	-100 µA	open	30 V	30 V	1,7,9
	I_{LKG}	86	30	0 V	0 V	open	30 V	2 V	1,7,9,20
4 T_A = +25°C	RR	87	This test shall be performed using the conditions and procedures listed in figure 3.						
7 T_A = +25°C	V_{NOISE1} V_{NOISE2}	88 89	These tests shall be performed using the conditions and procedures listed in figure 4.						

See footnotes at end of table.

TABLE III. Group A inspection for device type 01 - Continued.

Subgroup number	Symbol 1/	Test number	Pin measured			Equation 5/	Limits		Unit
			Number	Value	Unit		Min	Max	
3 T_A = -55°C	V_{REF}	74	6	E39	V	V_{REF} = E39	1.20	1.26	V
	V_{RLINE}	75	6	E40	V				
	V_{RLINE}	76	6	E41	V	V_{RLINE} = (E41 - E40) x 1000	-10	+10	mV
	V_{RLOAD}	77	6	E42	V				
	V_{RLOAD}	78	6	E43	V	V_{RLOAD} = (E43 - E42) x 1000	-5	+5	mV
3	I_{FB}	79	5,6	E44	V	I_{FB} = E44 x 1000		60	nA
	I_{OH}	80	9	I30	µA	I_{OH} = I30		2	µA
	V_{OL}	81	4	E45	V	V_{OL} = E45 x 1000		400	mV
	V_{UT}	82 6/	4	E46	V	E46 6/	2.0	30	V
	V_{LT}	83 6/	4	E47	V	E47 6/	0	0.8	V
	I_{SD1}	84	12	I31	µA	I_{SD1} = I31		100	µA
	I_{SD2}	85	12	I32	µA	I_{SD2} = I32		750	µA
	I_{LKG}	86	3	I33	µA	I_{LKG} = I33	+20	-20	µA
4 T_A = +25°C	RR	87	This test shall be performed using the conditions and procedures in figure 3.				50		dB
7 T_A = +25°C	V_{NOISE1}	88	These tests shall be performed using the conditions and procedures in figure 4.					600	µV
	V_{NOISE2}	89						250	µV

See footnotes at end of table.

TABLE III. Group A inspection for device type 01 - Continued.

1/ Unless otherwise specified, all tests performed using the circuit of figure 2.
2/ For V_{DO1}, the value of Z is initially (E1, E18, or E33) + 0.350 V. For V_{DO2}, the value of Z is initially (E1, E18, or E33). Z is then decremented by 10 mV, and at each value of Z, a corresponding measurement of the output voltage (E4, E5, E21, E22, E36, or E37) is taken. When the measured value of the output voltage drops more than 100 mV below it's nominal value (E1, E18, or E33), the input to output differential at that value of Z is defined as the dropout voltage (V_{DO}).
3/ Measure by shorting the output to ground through a 1.0Ω resistor (see figure 2).
4/ When the conditions for the V_{RTH} test are applied, set t = 0 ms. When t= 2 ms, take the first voltage measurement at pin 3 (E7). When t = 10 ms, take the second voltage reading at pin 3 (E8). V_{RTH} is defined as the difference between the two readings.
5/ Table III equations perform unit conversions from the measured value units to the limit value units.
6/ These tests do not measure the thresholds directly. They simply check to ensure that the threshold is in the expected region. These tests are go/no go tests; the measurement values themselves do not need to be recorded, only an indication of pass/fail. For V_{LT}, set the voltage at device pin 7 to E9 - 0.095 V for T_A = +25°C, E24 - 0.140 V for T_A = +125°C, and E39 - 0.140 for T_A = -55°C. For V_{UT}, set the voltage at device pin 7 to E9 - 0.040 V for T_A = +25°C, E24 - 0.025 V for T_A = +125°C, and E39 - 0.025 V for T_A = -55°C

4.4.4 Group D inspection. The group D inspection end-point electrical parameters shall be as specified in table IIA herein.

4.4.5 Group E inspection. Group E inspection is required only for parts intended to be marked as radiation hardness assured (see 3.5 herein). RHA levels for device classes B, S, Q, and V shall be M, D, R, and H and for device class M shall be M and D. RHA quality conformance inspection sample tests shall be performed at the RHA level specified in the acquisition document.

a. RHA tests for device classes B and S for levels M, D, R, and H or for device class M for levels M and D shall be performed through each level to determine at what levels the devices meet the RHA requirements. These RHA tests shall be performed for initial qualification and after design or process changes which may affect the RHA performance of the device.

b. End-point electrical parameters shall be as specified in table IIA herein.

c. Prior to total dose irradiation, each selected sample shall be assembled in its qualified package. It shall pass the specified group A electrical parameters in table I for subgroups specified in table IIA herein.

d. For device classes M, B, and S, the devices shall be subjected to radiation hardness assured tests as specified in MIL-M-38510 for RHA level being tested, and meet the postirradiation end-point electrical parameter limits as defined in table I at T_A = +25°C ±5 percent, after exposure.

e. Prior to and during total dose irradiation testing, the devices shall be biased to establish a worst case condition as specified in the radiation exposure circuit.

f. For device classes M, B, and S, subgroups 1 and 2 in table V, method 5005 of MIL-STD-883 shall be tested as appropriate for device construction.

g. When specified in the purchase order or contract, a copy of the RHA delta limits shall be supplied.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510 for device classes M, B, and S and MIL-I-38535 for device classes Q and V.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

6.1.1 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.1.2 Substitutability. Device classes B and Q devices will replace device class M devices.

6.2 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-STD-481 using DD Form 1693, Engineering Change Proposal (Short Form).

6.3 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system application requires configuration control and which SMD's are applicable to that system. DESC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronic devices (FSC 5962) should contact DESC-ECS, telephone (513) 296-6022.

6.4 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone (513) 296-5375.

6.5 Symbols, definitions, and functional descriptions.

6.6 One part - one part number system. The one part - one part number system described below has been developed to allow for transitions between identical generic devices covered by the four major microcircuit requirements documents (MIL-M-38510, MIL-H-38534, MIL-I-38535, and 1.2.1 of MIL-STD-883) without the necessity for the generation of unique PIN's. The four military requirements documents represent different class levels, and previously when a device manufacturer upgraded military product from one class level to another, the benefits of the upgraded product were unavailable to the Original Equipment Manufacturer (OEM), that was contractually locked into the original unique PIN. By establishing a one part number system covering all four documents, the OEM can acquire to the highest class level available for a given generic device to meet system needs without modifying the original contract parts selection criteria.

Military documentation format	Example PIN under new system	Manufacturing source listing	Document listing
New MIL-M-38510 Military Detail Specifications (in the SMD format)	5962-XXXXXZZ(B or S)YY (Part 1 or 2)	QPL-38510	MIL-BUL-103
New MIL-H-38534 Standardized Military Drawings	5962-XXXXXZZ(H or K)YY	QML-38534	MIL-BUL-103
New MIL-I-38535 Standardized Military Drawings	5962-XXXXXZZ(Q or V)YY	QML-38535	MIL-BUL-103
New 1.2.1 of MIL-STD-883 Standardized Military Drawings	5962-XXXXXZZ(M)YY	MIL-BUL-103	MIL-BUL-103

6.7 Sources of supply.

6.7.1 Sources of supply for device classes B and S. Sources of supply for device classes B and S are listed in QPL-38510.

6.7.2 Sources of supply for device classes Q and V. Sources of supply for device classes Q and V are listed in QML-38535. The vendors listed in QML-38535 have submitted a certificate of compliance (see 3.6 herein) to DESC-ECS and have agreed to this drawing.

6.7.3 Approved sources of supply for device class M. Approved sources of supply for class M are listed in MIL-BUL-103. The vendors listed in MIL-BUL-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DESC-ECS.

STANDARDIZED MILITARY DRAWING SOURCE APPROVAL BULLETIN

DATE: 91-12-27

Approved sources of supply for SMD 5962-38705 are listed below for immediate acquisition only and shall be added to MIL-BUL-103 during the next revision. MIL-BUL-103 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DESC-ECS. This bulletin is superseded by the next dated revision of MIL-BUL-103.

Standardized military drawing PIN	Vendor CAGE number	Vendor similar PIN 1/
5962-3870501MGX	27014	LP2951H/883
5962-3870501MPX	27014	LP2951J/883
5962-3870501M2X	27014	LP2951E/883

1/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

Vendor CAGE number	Vendor name and address
27014	National Semiconductor Corporation 2900 Semiconductor Drive P.O. Box 58090 Santa Clara, CA 95052-8090

The cross-reference information below is presented for the convenience of users. Microcircuits covered by SMD 5962-38705 will functionally replace the listed generic-industry type. Generic-industry microcircuit types may not have equivalent operational performance characteristics across military temperature ranges, postirradiation performance, or reliability factors equivalent to the listed SMD device types and may have slight physical variations in relation to case size. The presence of this information shall not be deemed as permitting substitution of generic-industry types for SMD types or as a waiver of any of the provisions of the applicable general specification.

Standardized military drawing PIN	Generic-industry PIN
5962-3870501BGX	LP2951H
5962-3870501BPX	LP2951J
5962-3870501B2X	LP2951E
5962-3870501SGX	LP2951H
5962-3870501SPX	LP2951J
5962-3870501S2X	LP2951E